5 Years Experience in Intracapsular Femoral Neck Fracture Management

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Abstract

Background: Displaced intracapsular fracture of the femoral neck remain a challenging issue despite the advancement in the ways of treatment .The purpose of this study is to assess the results of different methods of treatment in different age groups.

Methods: This study was conducted over a period from (1998-2004) on 26 patients, with ages of 5 – 85 years with intracapsular fracture of the femoral neck due to different insults in Tikrit teaching hospital. Open reduction and internal fixation was done to those patients of<60 years of age, while uncemented Austin-Moore hemiarthroplasty was conducted in patients of >60 years old. Patients were followed for 6-12 months for any complication.

Results: The main age group among the patients were those >60 years [13 (50%)]. The main cause of fracture was fall from standing position in 19 (73%), were treated by uncemented Austin-Moore prostheses. The main complications were hip and knee pain [8(30.7%) and5 (19.2%)] respectively.

Non-union (11.5%) and avascular necrosis (11.5%) was the commonest complications in young patients, and were treated by internal fixation especially if the time of surgery was delayed over 24 hours.

Conclusion: The reduction and internal fixation will continue to be used as the primary treatment of displaced intracapsular fracture in many younger patients because the benefits of preservation of the normal hip joint which should be done urgently within the first 24 hours. However, if this method of treatment is unsuccessful and requires revision, the risk of early complications is higher and hip function is poor. When hemiarthroplasty is the treatment of choice cemented fixation is preferable.

Key words: intracapsular, fracture, femoral neck

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Introduction

Hip fractures occur with increasing frequency as longevity has increased[1,2]. Increased age, dementia, a malignant tumor, and cardiopulmonary disease have all been associated with an increased risk of fracture of the femoral neck, and are of poorer outcome, and of a higher mortality rate[1,3,4,5,6].

Fracture of the femoral neck has a devastating effect on the blood supply to the femoral head [1,7,8]. The severity of the damage to the major blood supply-the lateral epiphyseal artery system-depends on the extent of displacement of the bones [1]. Dynamic blood flow studies recently showed that a minimally displaced fracture of the femoral neck in an adult produced a 60 percent decrease in blood flow to the head, but some elements of the situation remain under the surgeon's control [1]. Optimum reduction of the femoral neck fracture within the first 24 hours has been shown, in numerous studies, to be associated with a lower rate of avascular necrosis of femoral head [1]. Furthermore, stabilization of the fracture by internal fixation allows revascularization to proceed in an optimum mechanical environment [1].

Despite the frequency with which displaced intracapsular neck fracture occur, best management remains undecided. It is accepted that surgery is the mainstay of treatment, but debate continues on the role of internal fixation versus hemiarthroplasty, unipolar versus bipolar hemiarthroplasty and wether or not the prosthesis should be cemented [8,9].

Patients who are less than sixty –five years old and do not have a chronic illness should be managed with immediate reduction and internal fixation of femoral neck fracture with multiple pins or some type of cannulated or non- cannulated cancellous screws[1]. Patients who are more than seventy –five years old should be managed with prosthetic replacement[1]. Internal fixation is the treatment of choice for patients who are sixty-five to seventy-five years old and have high functional demands and good bone density .In those who have low functional demands, chronic illness, or poor bone density, bipolar replacement or total hip arthroplasty is recommended. Patients of any age who have a chronic illness or a limited life expectancy should be managed with unipolar replacement[1]. However, those who are less than seventy-five years old and have chronic disease but are expected to live longer than one year should be managed with bipolar replacement. When hemiarthroplasty is the treatment of choice, cemented fixation is preferable [8].

Methods

This study was conducted over a period from (1998-2004) on 26 patients (14 males and 12 females) in Tikrit teaching hospital; their age ranged between 5-85 years, all had intracapsular fracture of the femoral neck.

The fracture classified into 3 types (Undisplaced, displaced and comminuted). All these fractures were treated surgically; the method of treatment was

selected according to the age of the patient, degree of displacement and the availability of different implants. Partial hip replacement using Austin-Moore prostheses were performed in those patients of >60 years of age via posterior approach, while internal fixation after closed or open reduction was selected for the other group of patients (<60 years) using Watson-Jones approach.

Image intensifier was used in cases of internal fixation to check the reduction and for proper settlement of implant.

Revision of surgery was required in some patients due to loss of reduction due to usage of short screws, to manage infected prosthesis or in cases of non-union and avascular necrosis following internal fixation.

The patient with Austin- Moore prosthesis were allowed to sit on chair on the first post operative day and to put weight with the aid of walking aids within the first week, while those with internal fixation were abandoned to put weight until union is completed which is then checked by X-ray and by the capability of the patient to lift his leg straightly without pain.

Patients were followed for 6-12 months for any possibility of complications.

Results

Table-1 shows 26 patients (14 males and 12 females),and their age ranging 5 –85 years. The main age group, 13 patients (50%), was over 60 years, 8 patients (31 %) aged <30 years forming the second group, and the last 5 patients (19%) aged from 30 to 59 years.

The etiology of fracture mentioned in **Table-2**, it shows that, the main cause of fracture is fall on the ground in 19 (73%) especially in 13 osteoporotic elderly patients. RTA form the next important cause especially in 3 (11.5%) young patients, pathological fracture occurred in 2 patients (7.75%) due to osteomyelitis in one and bone cyst in the other child, and lastly the remaining 2 patients (7.75%) were due to missile injury.

Sixteen fractures (61.5%) were classified as displaced **Table- 3.**The other 9 (34.7%) were undisplaced and only 1 (3.8%) caused by bullet injury, and was classified as comminuted fracture.

The time lapsed from the time of insult until the time of interference is so crucial in determining the fate of events, the longer it was the more likely was the complications to see the sun light especially for those to whom internal fixation was the remedy. Fifteen (57.59%) of the patients were passing more than 72 hours before they seek for medical advice and only 6 (23.07%) were admitted within the first 24 hours **Ttable-4**.

(Table-5) declare that 4 (15.4%) patients had a fracture of femur or visceral injury, which play a role in missing the diagnosis of femoral neck fracture and increasing the possibility of complications.

Different modalities of treatment were selected based on the age of patients, the degree of displacement and according to the availability of each implant**. Table -6** clarify that hemiarthroplasty using Austin –Moore prosthesis was the main type had been done in 13(39.39%) patients aging > 60 years of age, while internal fixation in the form of three non-cannulated cancellus screws in 5 (15.15%), smooth pin in 2 (6.6%), DHS in 2 (6.6%) and pin plate in 1(3.3%) were done in < 60 years aged patients. Resection arthroplasty in 5 (15.15%) patients, bone grafting in 4 (12.12%) and subtrochanteric osteotomy in 1 (3.3%) patient, were kept for complicated cases treatment like avascular necrosis, non-union or delayed union respectively. Revision of surgery required in 4 patients, in the first 2 patients, the loss of reduction due to usage of short screws was the cause of infected non –union. Knawels pins were used instead in 8 years aged child, while pin plate+subtrochanteric osteotomy and bone grafting was the choice in the second young lady. The dislocation of Austin-Moore due to infection in 70 years man and the improper reduction and fixation with the result of non-union and avascular necrosis in 38 years patient were the causes in the remaining 2 patients for whom resection arthroplasty was the answer, and due to the shortage in the availability of bipolar or total hip prosthesis, Girdle Stone arthroplasty was also done to another 3 young patients with complicated fracture as primary treatment.

Patients face different complications occurred in isolation or in combination, the main one was painful hip which affect 8 (30.7%) patients especially for whom hemiarthroplasty were performed, painful knee was the second common complication in 5 (19.2%), infection occurred in the same number. Other complications like avascular necrosis in 3 (11.5%) and non-union in other 3 patients. Delayed union, dislocation and perforation of the lateral cortex by the tip of prosthesis occur in 1 (3.8%) patient for each case. CVA affect one female aged 80 years due to hypertension, and only one female patient aged 45 years was died within the first month post DHS osteosynthesis due to unknown cause. It is important to know that, only 5 (19.2%) among the patients were passed smoothly with out complications.

Discussion

The type of trauma that is associated with most femoral neck fracture (more than 90 %) is a fall from a standing position especially in those with poor bone quality [1]. The issue has been raised as to whether the fracture precedes the fall or the fall causes the fracture. Sloan and Holloway[1] found that 13(24%) of 54 patients had increased pain in the groin before the lower limb gave way. In the present study it was found that 19(73%) of 26 fractures were due to fall from standing position, while in 5 young patients (20%) occur predominantly due to high-energy injuries (RTA or missile injury).

The situations in which a femoral neck fracture may be missed are stress fracture, impacted fracture, silent or painless fracture in a bed-ridden patient and multiple injured patients, which may reach up to 40 %[10]. In the present study, the fracture was missed in 4 patients (16%) due to the last reason.

The two most commonly performed procedures in UK for those fractures in the frail or elderly are the uncemented Austin-Moore and cemented Thompson hemiarthroplasty [8, 9]. While urgent-if not emergent reduction of the femoral neck fracture with rigid internal fixation is the only way in young patients [1]. Among our patients uncemented Austin-Moore hemiarthroplasty were performed on 13 (41.9%) keeping variant forms of internal fixation to those aged <60 years.

Avascular necrosis occurs in 30% of patients with displaced fracture and 10% of those with undisplaced fractures [10]. Fielding et al, reported osteonecrosis in 40 (16%)of 256 patients [12]. Three (11.5%)of 26 patients in the present study developed osteonecrosis all of them were displaced two of them were missed due multiple injury and the third was due to improper reduction and fixation all of them were treated by resection arthroplasty.

More than one third of the femoral neck fractures fail to unite, and the risk is particularly high in those that are severely displaced [10].

Arnold *et al* [12] reported 15 percent rate of non-union in 1000 patients who had a displaced fracture. Of the 26 patients in the study 3 (11.5%) produce non-union and all treated by revision with the addition of bone graft and subtrochanteric osteotomy in one case.

Prosthetic replacement should be used for treatment of a femoral neck fracture in a patient who has lower functional demands, poor bone stock, an older physiological age (75 years) and of limited life expectancy [1]. Many authors have recently recommended a total hip replacement in active patients who are more than sixty – five years old, because many patients have had acetabular wear and consequent pain with activity after unipolar or bipolar replacement [1, 13]. In 8 (30.7%) out of 13 patients to whom uncemented Austin-Moore had been done, as other forms of prosthesis which was not available in our center, complain of hip pain on walking because of the selection of improper size was the cause, also some authors recommend the use of larger size if the proper size is not available to achieve wider contact surface between the acetabulum and the head of prosthesis resulting in less acetabular erosion. Another 5 patients (19.2%) of those with hemiarthroplasty were complaining of pain in the epsilateral knee and this can be explained by the trauma that produced during operation to the already osteoarthritic joint by using forceful external rotation of the hip for dislocation and settlement of the prosthesis via the posterior approach with the knee flexed 90 degree.

Infection is another important complication in our study it affects 5 (19.2%) of patients, 2 of them with prosthesis and leading to dislocation in one of them which treated by Girdle Stone arthroplasty while the other respond to bed rest and antibiotic, the other three cases follow internal fixation leading to loss of reduction which dictate for refixation and grafting in 2 and resection arthroplasty in the last one. Our result goes with that of Hunter who reported that the rate of infection was 2 to 42 percent after prosthetic replacement and less than that after internal fixation [1, 14].

(Table-1)
Number and Percentage of Patients with Fracture of Femoral Neck of in Relation to age and Sex

Age(Years)	*Male*		*Female*		*Total*	
	no	**%**	**no**	**%**	**no**	**%**
N-9	0	0	1	08.3	1	03.80
10-19	3	21.4	0	0	3	11.50
20-29	2	14.8	2	16.6	4	15.38
30-39	1	07.1	1	08.3	2	07.60
40-49	1	07.1	1	08.3	2	07.60
50-59	0	0	1	08.3	1	03.80
60-69	3	21.4	1	08.3	4	15.38
70-85	4	28.2	5	41.9	9	34.64
TOTAL	**14**	**100**	**12**	**100**	**26**	**100**

N=neonate

(Table-2)
Number and Percentage of Patients with Fracture of Femoral Neck in Relation to Different Etiology

Cause	**NO**	**%**
FALL ON GROUND	19	73.00
RTA	03	11.50
PATHOLOGICAL	02	07.75
OTHERS	02	07.75
TOTAL	**26**	**100**

RTA=road traffic accident

(Table3)
Number and Percentage of Patients with Fracture of Femoral Neck in Relation to Types of Fracture

TYPE OF FRACTURE	**NO**	%
Displaced	16	61.5
Undisplaced	09	34.7
Comminuted	01	03.8
Total	**26**	**100**

(Table-4)
Number and Percentage of Patients with Femoral Neck Fracture in Relation to Time of Presentation

Time of presentation	**no**	%
<24 hr	06	23.07
24-48 hr	02	07.69
48-72 hr	03	11.53
>72 hr	15	57.59
Total	**26**	**100**

(Table5)
Number and Percentage of Patients with Femoral Neck Fracture in Relation to Associated Injuries

Associated Injuries	No	%
Non	22	84.6
Fracture femur	03	11.6
Visceral injury	01	03.8
Total	**26**	**100**

(Table6)
Number and Percentage of Patients with Femoral Neck Fracture in Relation to Type of Treatment

Type of Treatment	no	%
Austin- Moore	13	39.39
Multiple screws	05	15.15
Bone graft*	04	12.12
Resection arthroplasty*	05	15.15
Knawels pins	02	06.60
DHS	02	06.60
Pin and plate	01	03.03
Subtrochanteric osteotomy*	01	03.03
Total	**33**	**100**

* These operations used to treat complication

(Table7)
Number and Percentage of Patients with Femoral Neck Fracture in Relation to Complication

Complication	no	%
Painful hip	8	30.7
Painful knee	5	19.2
Infection	5	19.2
Non	5	19.2
Non union	3	11.5
Avascular necrosis	3	11.5
Loss of reduction	2	07.6
Delayed union	1	03.8
Loosening	1	03.8
Dislocation of prosthesis	1	03.8
Perforation of femoral shaft	1	03.8
CVA	1	03.8
Death	1	03.8

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